MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

MASTER OF CS (SOFTWARE ENGINEERING AND SOFTWARE ARCHITECTURE)
TRIMESTER 2, 2015 / 2016

TAL 7011 – ARCHITECTURE OF LARGE SOFTWARE SYSTEMS

(All sections / Groups)

18 JANUARY 2016
8:00 P.M. – 10:00 P.M.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 pages (including cover page) with 5 Questions only.

2. Attempt **Question FIVE** and **ANY THREE** other questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

Question 1 (2 + 3 + 1 + 2 + 2 marks)

MyHotel is a budget hotel in Puchong that provides cheap accommodation to travelers and businessmen. It runs its business at a three-storey shop lot where the guest registration is done at the ground floor and the hotel rooms are at the upper floors.

The management of MyHotel would like to develop a computer-based system to support the following processes:

- Registration of hotel guests
- Check-out of hotel guests
- Payment of fees
- Generation of guests and fees reports

The system is to be implemented through a few networked computers at the ground floor of the hotel.

a) You are appointed as the software architect of this system. Discuss any TWO main responsibilities as the architect of this system.

b) Explain any THREE possible influences to the architecture of the new system.

c) Based on the information given, write a quality attribute scenario for ONE of the following quality attributes:
   - Security
   - Availability

d) Draw the quality attribute scenario diagram based on the description in Question 1(c).

e) Describe at least ONE possible tactic to achieve the quality attribute in Question 1(c).

Continued...

Question 2 (4 + 2 + 4 marks)

The medical centre at MM University is a busy place. It attends to over 50 students every day. The university has a new president who wishes to overhaul the existing medical support structure and modernise the facilities to improve the services. In order to plan for these changes, more information on which services are in fact used is required. The university wishes to develop a patient tracking system that traces each student throughout their stay in campus for visits to the medical centre. Various analysis reports are also required in the new system.

Currently, students are identified by their Student ID numbers. Information about a patient at the medical centre is kept on a card. When a patient visits the centre for the first time, a new card will be created and his/her personal details will be verified with the university admission office by a telephone call. For each visit, the following information are recorded on the card: room number, date, doctor's name, type of contact (i.e. consultation, treatment, follow-up check, routine check, emergency), diagnosis, medicine prescribed (i.e. name, brand, amount, dosage), and follow-up advise (yes/no). All the cards are kept in a cabinet sorted according to the student ID number for easy retrieval of the cards.

You are appointed as the software architect to develop a new computer-based medical system for this university.

a) Explain how you can use Attribute-Driven Design (ADD) to produce a coarse-grained architecture of this system.

b) Explain the criteria you can use to identify a suitable architectural pattern to expand the software architecture for this system. Using these criteria, give an architectural pattern that is suitable for this system.

c) Describe the architectural pattern identified in Question 2(b), giving illustration on how it can be applied to the abovementioned system.

Continued ...

Question 3 (3 + 2 + 2 + 3 marks)

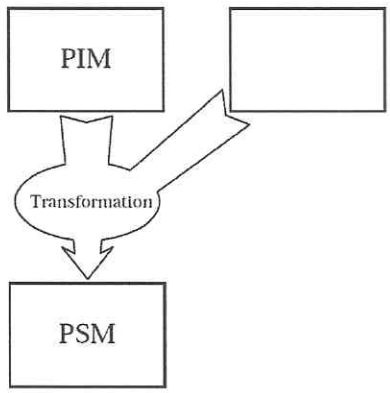
Faculty of Computing & Informatics is embarking on a project to develop an enhanced e-Learning system to provide a better online learning environment for its students. The new system will integrate with MMLS for existing features, and provide new forms of interactions for students to communicate with each other, lecturers and multimedia learning contents. Intelligent monitoring of student actions are proposed in this system so that context sensitive responses can be provided to the students based on their activities in the system.

a) Identify THREE main stakeholders and produce the candidate view list for the architecture document of this system.

b) Briefly describe the required documentation from MMLS in order to develop the integration with this system.

c) Explain how UML diagrams can be used to represent the architecture of a software system, presenting the following views:
   - Logical view
   - Process view
   - Development view
   - Physical view

d) The following diagram is a key process in Model Driven Architecture (MDA).



Explain the process in detail, with clear description of the contents of each box.

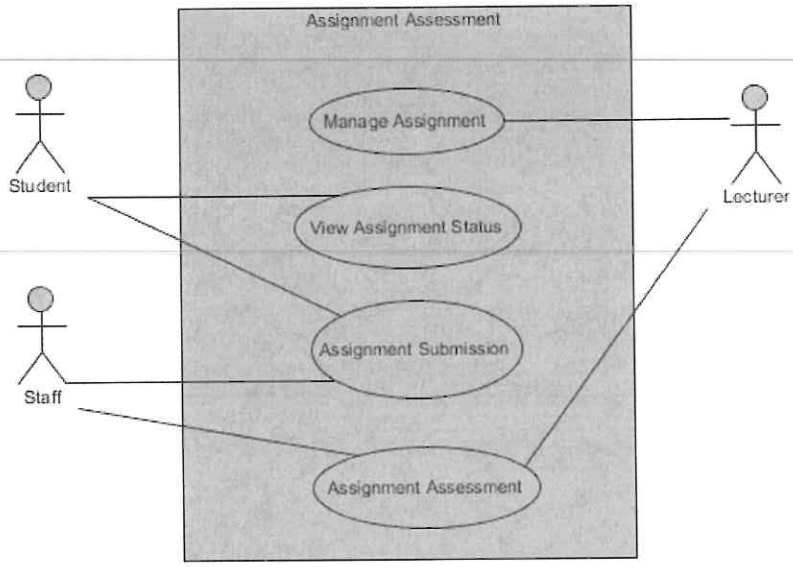
Continued...

Question 4 (4 + 2 + 4 marks)

FCI is developing a Web-based system to manage the submission of assignments by students where the students will be able to submit their assignments directly to the faculty office instead of finding the lecturers.

- The lecturers can create, upload, and amend assignments details which can be viewed by the students, and the assignment lists can be viewed by the faculty staff.
- To submit assignments, students are required to hand in their assignments to the faculty staff at the faculty office. The staff then records the assignment submission in the system.
- Students can view their assignment submission date and status in the system, to verify and monitor the status of the assignments.
- Lecturers can view the assignment submission list. They can then collect the assignments from the faculty office and the faculty staff will record the assignment collection.
- Lecturers can then assess the assignments and update the results in the system.

The following is the use case diagram:



a) Using the Jacobson use case technique, draw the second level use case diagram after the partitioning of this system.

b) Describe the two extended steps to improve this technique as proposed by Nasr, McDermid and Bernat (discussed in the lectures).

c) Explain any TWO of the following methods in mapping objects and classes to architectural components.
   - Simple Mapping
   - Hierarchical Mapping
   - Many-to-Many Mapping

Continued...

Question 5 (2 + 2 + 4 + 2 marks)

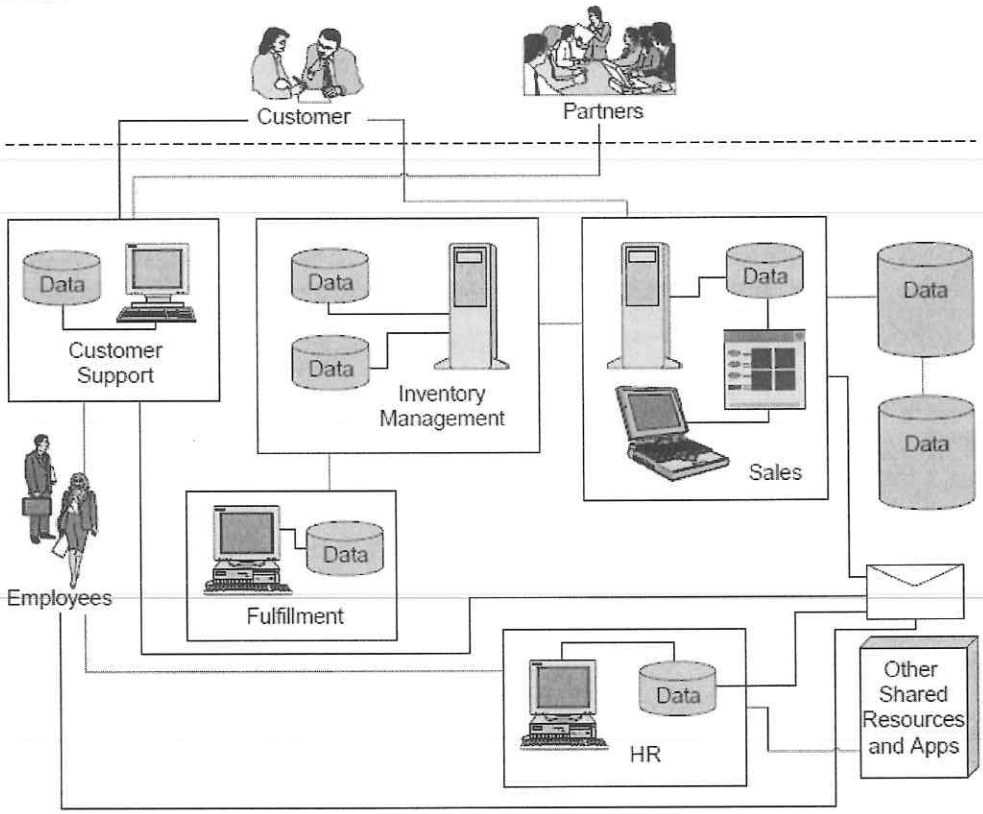


Figure 1

Figure 1 shows an enterprise software system for a company that supplies information and communication technology (ICT) products and services to its customers.

a) Using this example, explain the differences between enterprise architecture and solution architecture.

b) Give TWO reasons why the enterprise architecture is important to this organization.

c) Explain how the *gateway* and *mediator* integration styles could be used to integrate the different subsystems in Figure 1.

d) Describe any TWO structural components for this enterprise software architecture.

End of Page